ARISTOTLE'S OTHER LOGIC

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The science of Euclid's geometry was not infrequently pointed to in times past as a system of truth from which doubt had been forever banished. It was within the domain of space relationships that the greatest of the Pythagoreans had found his eternal truth[1] and for two millenniums following Plato's day the science of space had remained one of the chief strongholds of the absolutist's creed. It was a matter of no small concern, then, to pragmatic philosophy, that this science should in course of time have been successfully denied and other geometries created upon the ruins of the old; for thus had been destroyed in a very critical instance the ancient prejudice that all of the truth about anything can be contained within a single point of view. Cut loose from his geometric, and, as it turned out in the sequel, from his mechanistic moorings as well, the true lover of " things-in-themselves " had little left to turn to save that other science, which, begun by Aristotle, had been completed by the Stagirite within the span of his own life. If the fifth axiom of Euclid was self-evident, how much more that valid syllogism which goes by the name of *Celarent!*

For the benefit of those who may never have heard of those verses within whose cabalistic stanzas lie buried the valid forms of inference, let us spread out the mood to view:

> If (major premise) no *b* is *a*
> and (minor premise) all *c* is *b*
> then (conclusion) no *c* is *a*.

This inference, being true generally, will remain true for special values of the terms. Thus, if *b* is the same as *a*, the major premise seems to be untrue for all meanings of the terms, and the professional logician explains this seeming paradox by observing that if an impossibility be true then any conclusion will follow and this particular one along with the rest. If *c* and *a* be made identical the conclusion becomes untrue and our syllogism takes the form:

[1] *Τοῦ γὰρ ἀεὶ ὄντος ἡ γεωμετρικὴ γνῶσίς ἐστιν.*

If (major premise) no *b* is *a*
and (minor premise) all *a* is *b*,
the (conclusion) an impossibility is true

and this is interpreted to mean that "No *a* is *b*" and "All *a* is *b*" cannot both be true. If the contradictory of "a proposition that is untrue for all meanings of the terms" be "a proposition that is true for all meanings of the terms," then a familiar logical transformation will yield the result: it is true of necessity that "Some *a* is *b*" or that "Some *a* is not *b*."

It is by such devices as these that the "repeaters of Aristotle" might be expected to avoid the pitfalls of special cases and so maintain the complete generality of the science which they profess; and they might have succeeded to the end, had it not been that some ingenious meddler in the affairs of the understanding suddenly produced, and as suddenly held up to view, the notion of a class which has no members, and as illustrations of this hybrid of the imagination, which he called the "null-class," he pointed out the class of triangular circles and the class of alien Americans. Opposed to this class is another, which he called the "universe" and which contains the members of all other classes.

If we push our excavations further within the tumulus of that old mnemonic line there will soon come to light the mood of Ferio, and if we take the pains to identify the terms in the conclusion of this mood, it will appear, when spread out on the page, like this:

If (major premise) no *b* is *a*
and (minor premise) some *b* is *a*,
then (conclusion) an impossibility is true.

At this point we may allow to enter the null-class and the universe in order to try them out as special cases. Suppose that *b* represent *nothing* (null) and that *a* represent *everything* (universe). Our syllogism will then have to read:

If (major premise) none of nothing is everything
and (minor premise) some of nothing is everything,
then (conclusion) an impossibility is true.

Now, it is commonly taken to be a property of the null-class that its members are contained among the members of any class whatsoever and that they are all completely excluded from among the members of the universe. Hence each premise in this case is a true proposition and consequently this mood of the syllogism is invalid, which is the logician's way

of saying that the conclusion does not follow from the premises. The " repeaters of Aristotle " have always insisted that the two premises in question represent contradictory forms of judgment, by which they mean that one of the two is true of necessity and that they cannot both be true together. But here is an instance of their both being true and no impossibility implied, and to have pointed out such an instance is to have pointed out the necessity of a logic which is not Aristotle's own.

The propositions, which are fundamental in the Aristotelian scheme may be expressed as follows, (representing the four categorical forms, as is usual, by A(ab), E(ab), I(ab), O(ab) ; the small *a* standing for subject, the small *b* for predicate) :

I. A(ab) *is true* and O(ab) *is true* is impossible
E(ab) *is true* and I(ab) *is true* is impossible,
A(ab) *is false* and O(ab) *is false* is impossible,
E(ab) *is false* and I(b) *is false* is impossible,
II. A(ab) *is true* and E(ab) *is true* is impossible,
A(ab) *is false* and E(ab) *is false* is not impossible,
III. I(ab) *is true* and O(ab) *is true* is not impossible,
I(ab) *is false* and O(ab) *is false* is impossible,
IV. A(ab) *is true* and I(ab) *is true* is not impossible,
E(ab) *is true* and O(ab) *is true* is not impossible,
A(ab) *is false* and I(ab) *is false* is not impossible,
E(ab) *is false* and O(ab) *is false* is not impossible.

Propositions I enable us to say that A, O and E, I are *contradictory* pairs; II that A and E are *contraries;* III that I and O are *subcontraries;* IV that A, I and E, O are *subalternate* pairs.

The simplicity of the system depends on the fact that corresponding to any member of the set, A, E, I, O there is another member of the set, which stands for its contradictory; or otherwise, any categorical form, x(is false), may always be replaced by another categorical form, y(is true), and conversely. It will be seen, however, that this advantage is lost, as soon as subject and predicate are assumed capable of taking on the meanings " nothing " and " universe," for under these conditions not all the propositions under I, II, III, IV, remain true.

It is customary, because of this breakdown of the common logic, to regard the classical scheme of inference as one which excludes " nothing " and " universe " as possible meanings of the terms. We wish to indicate that this view is correct, by

pointing out that the traditional science is a special case of a more general system of inference, one, viz., which does not exclude these meanings of the terms, and whose denotation or application is consequently of larger extent.

We observe, in the first place, that *some a is not non-a* is not necessarily a true proposition, in virtue of the fact that there is nothing in the definition of the null-class to prevent our postulating it as false, when *a* stands for " nothing " and non-*a* for " universe."

In such a logic, a logic whose fundamental postulate would be *" some of nothing is not everything is a false proposition,"* all of the propositions I-IV, as well as all of the twenty-four moods of the syllogism, which are commonly taken to be valid, remain valid. It might appropriately be called *semi-Aristotelian* logic, because it not only retains all the characteristics of the traditional system but is able as well to interpret those new meanings, which have been introduced into the science since its inception. This name will also serve to distinguish it from a group of logics, whose existence I shall point out in another place, and which would best be called non-Aristotelian, because the characteristic postulate of each member of the group stands in contradiction to those of common logic and to those of each other member of the group.